REMARKS

This Amendment, filed in reply to the Office Action dated December 21, 2005, is believed to be fully responsive to each point of rejection raised therein. Accordingly, favorable reconsideration on the merits is respectfully requested.

Claims 1-8, 59, 62 and 64-69 remain pending the application. Claims 1-8, 59, 62 and 64-69 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Karellas (U.S.P. 5,864,146) in view of Perez-Mendez (U.S.P. 5,596,198), Takahashi et al. (U.S.P. 5,059,794) and Oikawa et al. (U.S.P. 5,483,071). Applicant hereinabove amends the claims to clarify the claim scope and further respectfully submits the following arguments in traversal of the prior art rejections.

Applicant's invention relates to a method and apparatus for efficiently reading out images from a stimulable phosphor, while minimizing dark currents. Application of a voltage to induce an avalanche effect in the photoconductor is provided via the electrodes disposed on opposite sides of a photoconductive layer. The avalanche effect allows effective read out without excessive dark current. As an exemplary electrode arrangement, Fig. 3 shows stripe electrode elements 22a, 26a disposed on opposite sides of a photoconductive member 23. The stripe electrode elements are disposed to be oriented in directions perpendicular to each other. One of the electrode structures may also comprise a planar electrode.

Karellas relates generally to an image readout apparatus, which includes a pixilated photoconductor CCD. Col. 33, lines 19-23. The pixilation is thought to improve resolution. An additional feature of Karellas is to eliminate saturation at the pixel level. To obviate this, Karellas does not read out image with a single excitation and detection but rather multiple

stimulating and read out cycles at low intensity. Col. 33, lines 39-53. Karellas further cautions that thermal heating would exacerbate dark current problems. Col. 33, lines 63-67.

Perez-Mendez also describes a segmented photoconductive element. This is clear from the segmented p-i-n layers 59, 60, 60 which are disposed between similarly segmented electrodes 55 and 62.

Oikawa relates to an imaging device having a switching arrangement disposed on one side of a photoconductive layer. Referring to Fig. 7, photoconductive layer 13 is bordered on one side by a uniform shaped conductor and on the other by a matrix of diodes for reading out current generated by image-information bearing charge. A planar conductor 43 is disposed on a side away from the photoconductive layer to impart an avalanche effect. The positioning of the planar conductor away from the photoconductive layer is to mitigate noise effects due to avalanche. Col. 2, line 65 to col. 3, line 1.

Takahashi describes a photoconductive layer, with parallel disposed electrodes 23-1, 23-2 on opposite sides. The photoconductor is separated from layer 23-2 by an insulator 24. In addition, the phosphor layer of the Takahashi reference does not have a latent image accumulating function, and therefore, it is necessary to accumulate latent images on the solid state detector, by applying voltage thereto during X-ray irradiation. For this reason, dark current overlaps on the latent image, which deteriorates the image quality. The deterioration in image quality is particularly conspicuous in the case that the X-ray intensity is weak, and the X-ray irradiation time is long.

The Examiner concedes that the primary reference Karellas fails to teach or suggest each feature of independent claim 1. In particular, the Examiner concedes that Karellas does not

include the imparting of an electric voltage to the photoconductive layer to impart an avalanche effect. The Examiner relies on Takahashi to teach an avalanche effect, and relies on Oikawa to similarly teach an avalanche effect, photoconductive layer thicknesses and the positioning of the electrodes relative to the photoconductor. The Examiner contends it would be obvious to combine the references to generally improve detection sensitivity. Applicant respectfully submits that the rejection is not supported for at least the following reasons.

First, the Examiner's rationale to include an avalanche effect in Karellas does not appear to be well-founded. Karellas seeks to provide incremental read out of charges stored as a result of image recording for purposes of avoiding saturation. Relatedly, Karellas seeks to minimize any effects of dark current that result from thermal heating of the photoconductive elements. One skilled in the art would understand that the application of a high voltage sufficient to create an avalanche effect would completely undermine both of these basic objects disclosed in Karellas. In particular, the avalanche effect would not permit for the incremental, low intensity-based read-out for purposes of saturation avoidance. Additionally, the high voltages would induce thermal noise and increase dark currents. Perez-Mendez would similarly teach away from use of an avalanche condition for similar reasons. Col. 7, lines 49-55.

Second, the references Oikawa, Perez-Mendez, and Karellas employ TFT's or CCD's as charge accumulating sections. The voltage resistance of TFT's and CCD's are generally from 60 to 100V. However, avalanche voltages are 400 to 2000V, and if these voltages we applied to TFT's or CCD's, the charge accumulating sections will be destroyed. Therefore, the structures f the prior art would not permit avalanche effects as the Examiner appears to suggest.

Third, Takahashi does not include a phosphor layer capable of storing a latent image. Rather, it is necessary to accumulate latent images on the solid state detector, by applying voltage thereto during X-ray irradiation. For this reason, dark current overlaps on the latent image, which deteriorates the image quality. In contrast, the present invention does not accumulate latent images on the solid state detector, but accumulates latent images on the stimulable phosphor layer which has the latent image accumulating function. By adopting the structure of the present invention, there is no necessity to apply voltages to the solid state detector during X-ray irradiation. Accordingly, dark current does not overlap on the latent image, and high image quality can be realized.

Fourth, the foregoing reasons indicate that the Examiner is merely picking and choosing elements from individual references without an appreciation for the fact that the claimed structure obviates objects of the references when a combination is attempted. Therefore, claim 1 is patentable for at least the above reasons. Claims 5 and 62 are patentable for analogous reasons, and the remaining claims are patentable based on their dependency.

The Examiner has also provided some rebuttals to several arguments previously made of record. Applicant maintains that the rejections are improper for the reasons previously submitted in addition to those set forth above.

With further regard to claims 64-66, the Examiner concedes that Karellas does not include spaced apart electrodes, where electrodes are disposed on both sides of the photoconductive layer. The Examiner relies on Perez-Mendez to teach an array of spaced apart electrodes. Assuming *arguendo* that the reference may be combined, their combination does not teach each feature of claim 1. Claim 1 describes stripe electrodes, in disposition perpendicular to

each other, on both sides of the photoconductive layer. To the extent Oikawa describes stripe electrodes, they are disposed on the same side of the photoconductive layer, To the extent Perez-Mendez and Takahashi teach electrodes disposed on opposite sides of a photoconductive layer, they are not oriented as stripe electrodes in the manner claimed.

Relatedly, there is no basis for modifying the orientation or disposition of the electrodes to provide the claimed structure. For example, in Oikawa, the stripe electrodes are disposed on a same side to provide some distance between the photoconductive layer and the electrode for applying a biasing (avalanche) voltage in order to inhibit noise. In Perez-Mendez, the stripe electrodes would not be used because part of the electrode (62) forms a storage capacitor with underlying layers (50). The capacitor is provided for purposes of storing charge on a pixilated basis, and the substitution of a set of stripe electrodes would completely obviate this effect. Claims 64-66 are patentable for this additional reason.

Applicant adds claims 70-72 to describes features of the invention more particularly.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

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